

CLAIMS

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1. A ball-nut assembly comprising:
 - a) a ball nut including a radial through slot and including an outer surface having a first portion, having a ledge radially recessed from the first portion and at least partially bounding the through slot, and having an undercut wall connecting the ledge and the first portion; and
 - b) a crossover member having a flange supported by the ledge and having a crossover-grooved portion disposed in the through slot, wherein the flange has at least one deformed portion contacting the undercut wall of the outer surface of the ball nut.
 2. The ball-nut assembly of claim 1, wherein the ledge has an annular shape, surrounds the through slot, and annularly supports the flange.
 3. The ball-nut assembly of claim 2, wherein the undercut wall has axially-opposing first and second end portions, and wherein the at-least-one deformed portion includes first and second deformed portions respectively contacting a corresponding one of the first and second end portions of the undercut wall.
 4. The ball-nut assembly of claim 3, wherein the first portion has a cylindrical shape.
 5. The ball-nut assembly of claim 4, wherein the crossover member has a flat outward facing surface disposed below the first portion of the outer surface of the ball nut.
 6. The ball-nut assembly of claim 5, wherein ball nut is a vehicle-brake-pad-driving ball nut.

7. A ball-screw-and-ball-nut assembly comprising:

a) a ball nut including an inside helical groove, including a radial through slot, and including an outer surface having a first portion, having a ledge radially recessed from the first portion and at least partially bounding the through slot, and having an undercut wall connecting the ledge and the first portion;

b) a crossover member having a flange supported by the ledge and having a crossover-grooved portion disposed in the through slot, wherein the flange has at least one deformed portion contacting the undercut wall of the outer surface of the ball nut;

c) a ball screw including an outside helical groove and disposed inside the ball nut; and

d) a plurality of balls contacting the crossover-grooved portion of the crossover member and a portion of the inside and outside helical grooves.

8. The ball-screw-and-ball-nut assembly of claim 7, wherein the ledge has an annular shape, surrounds the through slot, and annularly supports the flange.

9. The ball-screw-and-ball-nut assembly of claim 8, wherein the undercut wall has axially-opposing first and second end portions, and wherein the at-least-one deformed portion includes first and second deformed portions respectively contacting a corresponding one of the first and second end portions of the undercut wall.

10. The ball-screw-and-ball-nut assembly of claim 9, wherein the first portion has a cylindrical shape.

11. The ball-screw-and-ball-nut assembly of claim 10, wherein the crossover member has a flat outward facing surface disposed below the first portion of the outer surface of the ball nut.

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12. The ball-screw-and-ball-nut assembly of claim 11, wherein ball screw is an electric-motor-driven ball screw, and wherein the ball nut is a vehicle-brake-pad-driving ball nut.

13. A method for making a ball-nut assembly comprising the steps of:

a) obtaining a ball nut including a radial through slot and including an outer surface having a first portion, having a ledge radially recessed from the first portion and at least partially bounding the through slot, and having an undercut wall connecting the ledge and the first portion;

b) obtaining a crossover member having a flange and a crossover-grooved portion;

c) disposing the crossover member from outside the ball nut to have the flange supported by the ledge and the crossover-grooved portion disposed in the through slot; and

d) deforming the flange creating a staked portion of the flange which contacts the undercut wall of the outer surface of the ball nut.

14. The method of claim 13 also including after step a) and before step c) the step of aligning the ball nut on a locating arbor which simulates balls placed around a ball screw.

15. The method of claim 14, wherein step c) includes aligning the crossover member on the locating arbor.

16. The method of claim 15, also including between steps c) and d) the step of checking the radial position of the crossover member with a position indicator.

17. The method of claim 15, also including between steps c) and d) the step of clamping the crossover member against the locating arbor.

18. The method of claim 15, wherein step d) includes using a stake punch.

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